AMENDMENTS TO THE CLAIMS

1. (currently amended) A color conversion device for performing pixel-by-pixel color conversion from a first set of three color data representing red, green and blue, or cyan, magenta and yellow, into a second set of three color data representing red, green and blue, or cyan, magenta, and yellow, said device comprising:

first calculation means for calculating a minimum value α and a maximum value β of said first set of three color data for each pixel;

hue data calculating means for calculating hue data r, g, b, y, m and c based on said first set of three color data, and said minimum and maximum values α and β outputted from said first calculation ~~calculating~~ means;

means for generating first comparison-result data based on the hue data outputted from said hue data calculating means;

means for generating second comparison-result data based on said first comparison-result data;

coefficient storage means for storing matrix coefficients for the hue data, the first comparison-result data and the second comparison-result data;

coefficient setting means for setting specified coefficients in said coefficient storage means; and

second calculation means responsive to said hue data, said

first comparison-result data, said second comparison-result data, and the coefficients from said coefficient storage means for calculating said second set of three color data representing red, green and blue, or cyan, magenta, and yellow,

said second calculation means performing calculation including matrix calculation performed at least on said hue data, said first comparison-result data, said second comparison-result data, and the coefficients from said coefficient storage means.

2. (original) The color conversion device according to claim 1, wherein said second calculation means performs said matrix calculation on said hue data, said first comparison-result data, said second comparison-result data, and the coefficients from said coefficient storage means, and further includes synthesizing means for adding said minimum value α from said first calculation means to the results of said matrix calculation.

3. (currently amended) The color conversion device according to claim 2, wherein

said coefficient storage means outputs predetermined matrix coefficients Eij (i = 1 to 3, j = 1 to 3), and Fij (i = 1 to 3, j = 1 to 12), and

said second calculation means performs the calculation using the hue data, said first comparison-result data, said second

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comparison-result data, said minimum value α from said ~~calculating~~

first calculation means, and said matrix coefficients to determine

said second set of three color data representing red, green and

blue, denoted by Ro, Go and Bo, in accordance with the following

formula (1):

$$
\begin{bmatrix} Ro \\ Go \\ Bo \end{bmatrix} = (Eij) \begin{bmatrix} r \\ g \\ b \end{bmatrix} + (Fij) \begin{bmatrix} h1r \\ h1g \\ h1b \\ h1c \\ h1m \\ h1y \\ h2ry \\ h2rm \\ h2gy \\ h2gc \\ h2bm \\ h2bc \end{bmatrix} + \begin{bmatrix} \alpha \\ \alpha \\ \alpha \end{bmatrix} \quad \ldots(1)
$$

wherein h1r, h1g, h1b, h1c, h1m and h1y denote said first

comparison-result data, and h2ry, h2rm, h2gy, h2gc, h2bm and h2bc

denote said second comparison result data.

4. (currently amended) The color conversion device according to

claim 2, wherein

said coefficient storage means outputs predetermined matrix

coefficients Eij (i = 1 to 3, j = 1 to 3), and Fij (i = 1 to 3, j =

1 to 12), and

said second calculation means performs the calculation using

the hue data, said first comparison-result data, said second comparison-result data, said minimum value α from said ~~calculating~~ first calculation means, and said matrix coefficients to determine said second set of three color data representing cyan, magenta and yellow denoted by Co, Mo and Yo, in accordance with the following formula (2):

$$
\begin{bmatrix} Co \\ Mo \\ Yo \end{bmatrix} = (Eij) \begin{bmatrix} c \\ m \\ y \end{bmatrix} + (Fij) \begin{bmatrix} h1r \\ h1g \\ h1b \\ h1c \\ h1m \\ h1y \\ h2ry \\ h2rm \\ h2gy \\ h2gc \\ h2bm \\ h2bc \end{bmatrix} + \begin{bmatrix} \alpha \\ \alpha \\ \alpha \end{bmatrix} \quad \ldots (2)
$$

wherein h1r, h1g, h1b, h1c, h1m and h1y denote said first comparison-result data, and h2ry, h2rm, h2gy, h2gc, h2bm and h2bc denote said second comparison result data.

5. (original) The color conversion device according to claim 1, wherein said second calculation means performs said matrix calculation on said hue data, said first comparison-result data, said second comparison-result data, the coefficients from said coefficient storage means, and said minimum value α from said first

calculation means.

6. (currently amended) The color conversion device according to

claim 5, wherein

said coefficient storage means outputs predetermined matrix

coefficients Eij (i = 1 to 3, j = 1 to 3), and Fij (i = 1 to 3, j =

1 to 13), and

said second calculation means performs the calculation using

the hue data, said first comparison-result data, said second

comparison-result data, said minimum value α from said <u>first</u>

<u>calculation</u> ~~calculating~~ means, and said matrix coefficients to

determine said second set of three color data representing red,

green and blue, denoted by Ro, Go and Bo, in accordance with the

following formula (3):

$$\begin{bmatrix} Ro \\ Go \\ Bo \end{bmatrix} = (Eij) \begin{bmatrix} r \\ g \\ b \end{bmatrix} + (Fij) \begin{bmatrix} h1r \\ h1g \\ h1b \\ h1c \\ h1m \\ h1y \\ h2ry \\ h2rm \\ h2gy \\ h2gc \\ h2bm \\ h2bc \\ \alpha \end{bmatrix} \quad \dots(3)$$

wherein h1r, h1g, h1b, h1c, h1m and h1y denote said first comparison-result data, and h2ry, h2rm, h2gy, h2gc, h2bm and h2bc denote said second comparison result data.

7. (currently amended) The color conversion device according to claim 5, wherein

said coefficient storage means outputs predetermined matrix coefficients Eij (i = 1 to 3, j = 1 to 3), and Fij (i = 1 to 3, j = 1 to 13), and

said second calculation means performs the calculation using the hue data, said first comparison-result data, said second comparison-result data, said minimum value α from said <u>first calculation</u> ~~calculating~~ means, and said matrix coefficients to determine said second set of three color data representing cyan, magenta and yellow denoted by Co, Mo and Yo, in accordance with the following formula (4):

$$
\begin{bmatrix} Co \\ Mo \\ Yo \end{bmatrix} = (Eij) \begin{bmatrix} c \\ m \\ y \end{bmatrix} + (Fij) \begin{bmatrix} h1r \\ h1g \\ h1b \\ h1c \\ h1m \\ h1y \\ h2ry \\ h2rm \\ h2gy \\ h2gc \\ h2bm \\ h2bc \\ \alpha \end{bmatrix} \qquad ...(4)
$$

wherein h1r, h1g, h1b, h1c, h1m and h1y denote said first comparison-result data, and h2ry, h2rm, h2gy, h2gc, h2bm and h2bc denote said second comparison result data.

8. (original) The color conversion device according to claim 1, wherein

said first set of three color data represent red, green and blue,

said second set of three color data represent red, green and blue, and

said hue data calculation means calculates the hue data r, g, b, y, m, c by subtraction in accordance with:

r = Ri - α,

g = Gi - α,

b = Bi - α,

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$y = \beta - Bi,$

$m = \beta - Gi,$ and

$c = \beta - Ri,$

wherein Ri, Gi and Bi represent said first set of three color data.

9. (currently amended) The color conversion device according to claim 1, wherein

said first set of three color data represent cyan, magenta and yellow,

said second set of three color data represent red, green and blue,

said device further comprises means for determining a complement of said first set of three color data, and

said hue data calculation means calculates the hue data r, g, b, y, m, c by subtraction in accordance with:

$r = Ri - \alpha,$

$g = Gi - \alpha,$

$b = Bi - \alpha,$

$y = \beta - Bi,$

$m = \beta - Gi,$ and

$c = \beta - Ri,$

wherein Ri, Gi and Bi represent data produced by the

determination of the complement of said first set of three color

data.

10. (original) The color conversion device according to claim 1,
wherein

said first set of three color data represent cyan, magenta and
yellow,

said second set of three color data represent cyan, magenta
and yellow, and

said hue data calculation means calculates the hue data r, g,
b, y, m, c by subtraction in accordance with:

$r = \beta - Ci$,

$g = \beta - Mi$,

$b = \beta - Yi$,

$y = Yi - \alpha$,

$m = Mi - \alpha$, and

$c = Ci - \alpha$.

wherein Ci, Mi and Yi represent said first set of three color

data.

11. (currently amended) The color conversion device according to

claim 1, wherein

said first set of three color data represent red, green and

blue,

said second set of three color data represent cyan, magenta and yellow,

said device further comprises means for determining a complement of said first set of three color data, and

said hue data calculation means calculates the hue data r, g, b, y, m, c by subtraction in accordance with:

r = β - Ci,

g = β - Mi,

b = β - Yi,

y = Yi - α,

m = Mi - α, and

c = Ci - α.

wherein Ci, Mi and Yi represent data produced by the determination of the complement of said first set of three color data.

12. (original) The color conversion device according to claim 1, wherein

said first comparison-result data generating means determines the comparison-result data among the hue data r, g and b, and the comparison-result data among the hue data y, m and c, and

said second comparison-result data generating means comprises

multiplying means for multiplying the first comparison-result data

outputted from said first comparison-result data generating means

with specific calculation coefficients, and means for determining

the comparison-result data based on the outputs of said

multiplication means.

13. (original) The color conversion device according to claim 12,

wherein

said first comparison-result data generating means determines

the first comparison-result data:

$h1r = min\ (m,\ y)$,

$h1g = min\ (y,\ c)$,

$h1b = min\ (c,\ m)$,

$h1c = min\ (g,\ b)$,

$h1m = min\ (b,\ r)$, and

$h1y = min\ (r,\ g)$,

(with min (A, B) representing the minimum value of A and B),

said second comparison-result data generating means determines

the second comparison-result data:

$h2ry = min\ (aq1*h1y,\ ap1*h1r)$,

$h2rm = min\ (aq2*h1m,\ ap2*h1r)$,

$h2gy = min\ (aq3*h1y,\ ap3*h1g)$,

$h2gc = min\ (aq4*h1c,\ ap4*h1g)$,

$h2bm = min\ (aq5*h1m,\ ap5*h1b)$, and

h2bc = min (aq6*h1c, ap6*h1m).

14. (original) The color conversion device according to claim 12, wherein

said multiplying means in said second comparison-result data generating means performs calculation on said first comparison result-data and said calculation coefficients by setting said calculation coefficients aq1 to aq6 and ap1 to ap6 to integral values of 2^n, with n being an integer, and by bit shifting.

15. (original) The color conversion device according to claim 1, wherein each of said first comparison-result data is determined from two of the hue data and is effective for only one of the six hues of red, green, blue, cyan, magenta and yellow.

16. (original) The color conversion device according to claim 1, wherein each of said second comparison-result data is determined from two of the first comparison-result data and is effective for only one of the six inter-hue areas of red-yellow, yellow-green, green-cyan, cyan-blue, blue-magenta, and magenta-red.

17. (original) The color conversion device according to claim 1, wherein

said coefficient storage means outputs specified matrix

coefficients Eij (i = 1 to 3, j = 1 to 3) based on a formula (5) below:

$$(Eij) \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad ...(5)$$

18. (original) The color conversion device according to claim 1, wherein

said first calculation means calculates a maximum value β and a minimum value α using said first set of three color data, and generates an identification code indicating the hue data which is of a value zero, and

said coefficient storage means outputs said matrix coefficients based on the identification code outputted from said first calculation means, and

said second calculation means performs matrix calculation using the coefficient from said coefficient storage means to produce said second set of three color data based on the identification code outputted from said first calculation means.

19. (currently amended) A method of manufacturing a color conversion device which is for use with an input or output device and which performs pixel-by-pixel color conversion from a first set of three color data representing red, green and blue, or cyan,

magenta and yellow, into a second set of three color data

representing red, green and blue, or cyan, magenta, and yellow,

said color conversion device comprising:

first calculation means for calculating a minimum value α and

a maximum value β of said first set of three color data for each

pixel;

hue data calculating means for calculating hue data r, g, b,

y, m and c based on said first set of three color data, and said

minimum and maximum values α and β outputted from said <u>first</u>

<u>calculation</u> ~~calculating~~ means;

means for generating first comparison-result data based on the

hue data outputted from said hue data calculating means;

means for generating second comparison-result data based on

said first comparison-result data;

coefficient storage means for ~~storing~~ <u>providing</u> coefficients

for the hue data, the first comparison-result data and the second

comparison-result data; and

second calculation means responsive to said hue data, said

first comparison-result data, said second comparison-result data,

and the coefficients from said coefficient storage means for

calculating said second set of three color data representing red,

green and blue, or cyan, magenta, and yellow,

said second calculation means performing calculation including

matrix calculation performed at least on said hue data, said first

comparison-result data, said second comparison-result data, and the

coefficients from said coefficient storage means, said method

comprising the steps of:

(a) producing [[a]] the color conversion device which includes

the above-recited elements, but in which said coefficients are not

stored in said coefficient storage means; and

(b) writing said coefficients [[in]] to said coefficient

storage means ~~taking into consideration the~~ on the basis of

characteristics of the input and output device with which the color

conversion device is to be used.

20. (previously presented) A color conversion device for performing

pixel-by-pixel color conversion from a first set of three color

data representing red, green and blue, or cyan, magenta, and

yellow, into a second set of three color data representing red,

green and blue, or cyan, magenta, and yellow, said device

comprising:

a coefficient storage for storing matrix coefficients;

coefficient setting means for setting the matrix coefficients

in said coefficient storage;

a first calculation term generator for generating a plurality

of first calculation terms, each of which is effective for just one

of the hues of red, green, blue, cyan, magenta and yellow;

a second calculation term generator for generating a plurality of second calculation terms, each of which is effective for just one of the inter-hue regions between the six hues of red, green, blue, cyan, magenta and yellow; and

a matrix calculator for performing calculation including matrix calculation using the matrix coefficients stored in said coefficient storage, and said second calculation terms.

21. (previously presented) The color conversion device according to claim 20, wherein said second calculation term generator generates each of the second calculation terms using at least two of the first calculation terms.

22. (previously presented) The color conversion device according to claim 20, further comprising a tone converter for converting the tone characteristics of the color data obtained by said matrix calculator to generate said second set of color data.

23. (previously presented) The color conversion device according to claim 21, further comprising a hue data calculator for calculating hue data r, g, b, c, m and y based on said first set of three color data,

wherein said first calculation term generator generates each of the first calculation terms based on two or more of the six hue

data.

24. (previously presented) The color conversion device according to claim 23, wherein said first calculation term generator generates, as each of said first calculation terms, first comparison-result data obtained by determining a first minimum value of two of the hue data.

25. (previously presented) The color conversion device according to claim 24, wherein said second calculation term generator includes:

multipliers respectively multiplying the first comparison-result data by calculation coefficients; and

a minimum value selector for generating, as second comparison-result data, a second minimum value of the results of the multiplication by said multipliers; and

said second calculation term generator uses said second minimum value as said second calculation term.

26. (previously presented) The color conversion device according to claim 23, further comprising:

a maximum and minimum calculator for calculating a maximum, value ß and a minimum value α of the first set of color data,

wherein said hue data calculator determines the hue data based on the first set of color data and the maximum and minimum values.

27. (previously presented) The color conversion device according to claim 26, wherein said calculator also uses said minimum value in the matrix calculation.

28. (previously presented) The color conversion device according to claim 26, wherein said calculator adds said minimum value to the result of the matrix calculation.